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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/521,736

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Hans-Dieter Feucht

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6903

466

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09/28/2006

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EXAMINER

HE, AMY

ART UNIT

PAPER NUMBER

2858

DATE MAILED: 09/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/521,736	<b>Applicant(s)</b> FEUCHT ET AL.	
	<b>Examiner</b> Amy He	<b>Art Unit</b> 2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-23 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,2 and 4-23 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 19 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 4-6, 8-10, 13-16, 18 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150), in view of Kosslinger et al. (Applicant's admitted prior art as disclosed in specification page 2, lines 4-24).

As for claim 1, Kobrin discloses a device (in Figure 1) for detecting at least one substance of a chemical, having at least one piezo acoustic resonator (8) comprising:

at least one piezoelectric layer (16);

an electrode (14) disposed on the piezoelectric layer;

at least one further electrode (32) disposed on the piezoelectric layer; and

a surface section (6) for sorption of the substance of the chemical;

wherein the piezoelectric layer, the electrodes and the surface section are arranged with respect to one another in such a way that an electrical actuation of the electrodes leads to an oscillation of the resonator at a resonance frequency and the resonance frequency is dependent on an amount of the substance sorbed on the surface section (col. 3 line 44-col. 4 line 11); and

a layer thickness of the piezoelectric layer (16) is chosen from the range of 0.1um inclusive to 20 um (1.5 um, col. 5, lines 45-61) inclusive and the resonance frequency of the oscillation is chosen from the range of 500 MHz inclusive to 10 GHz inclusive (1-10 GHz, see claim 3 and 11).

Although Kobrin does not specifically disclose that the chemical sensed is a fluid, the intended use of the claimed invention (i.e. for detecting substance of a fluid) did not result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. The prior art structure as taught by Kobrin is capable of performing the intended use of detecting the substance of a fluid. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Still referring to claim 1, Kobrin does not specifically disclose that the oscillation of the resonator is thickness shear mode oscillation.

Kosslinger et al. discloses that the oscillation of an resonator is thickness shear mode oscillation, for detecting a substance of fluid to produce bulk acoustic waves (instant specification page 2, lines 13-15).

A person of ordinary skill in the art would find it obvious at the time the invention was made to modify Kobrin, to incorporate the use of a conventional thickness shear mode oscillation, as taught by Kosslinger et al., for the purpose of detecting the substance of a fluid to produce bulk acoustic waves (instant specification page 2, lines 12-15).

As for claim 4, Kobrin discloses that the piezoelectric layer uses aluminum nitride as the piezoelectric material, (col. 3, lines 25-27).

As for claim 5, Kobrin discloses that the resonator (8) is disposed on a semiconductor substrate (12).

As for claim 6, Kobrin discloses at least one device (resonant acoustic isolator 10) for providing acoustic insulation of the resonator and the semiconductor substrate.

As for claims 8 and 10, Kobrin discloses at least one external evaluation device (means for measuring the change in resonant frequency, col. 3, lines 7-9) for determining the resonance frequency of the resonator.

As for claim 9, Kobrin does not specifically disclose that the evaluation device is an internal evaluation device disposed in the semiconductor substrate. A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin to dispose the external evaluation device in the semiconductor substrate so as to integrate the evaluation device on the semiconductor substrate, for the purpose of reducing the size of the overall structure, since it has been held "that the use of a one piece construction instead of the structure disclosed (in the prior art) would be merely a matter of obvious engineering choice." *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965).

As for claim 13, Kobrin discloses that the surface for sorption of the substance of the fluid is formed by a chemically sensitive coating of the resonator (col. 2, lines 39-41).

As for claim 14, Kobrin discloses that the resonator (8) has a protective layer (13) and the chemically sensitive coating (6) is applied to the protective layer.

As for claims 15-16, Kobrin discloses a plurality of resonators, combined to form a resonator array and each of the resonators forms an array element of the resonator array (see claim 9), each of the resonators in the resonator array serves to detect a specific substance (a specific chemical of interest).

As for claim 18, Kobrin discloses a method for detecting at least one substance of a chemical using a device as in claim 1, comprising: bring the chemical and the piezo acoustic resonator into contact in such a way that the substance can be sorbed on the surface section of the resonator, and determining a resonance frequency of the resonator, whereby the amount of the substance sorbed on the surface section can be deduced from the resonance frequency (col. 2 line 63-col. 3 line 9; col. 6, lines 21-41).

Although Kobrin does not specifically disclose that the chemical sensed is a fluid, the intended use of the claimed invention (i.e. for detecting substance of a fluid) did not result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. The prior art structure as taught by Kobrin is capable of performing the intended use of detecting the substance of a fluid. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

As for claim 22, Kobrin discloses that the chemically sensitive coating has molecules (organic polymer, col. 5, lines 29-30) for detecting the substance.

As for claim 23, Kobrin discloses that the chemically sensitive coating has an immobilization layer for connecting the resonator and the molecules for detecting the substance (col. 5, lines 37-44).

2. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150) in view of Kosslinger et al. (applicant's admitted prior art, see specification page 2, lines 4-24), and further in view of H. Baltes (applicant's admitted prior art, specification page 4, line 29-page 5, line 21).

As for claim 2, Kobrin in view of Kosslinger et al. discloses the device as in claim 1. Kobrin in view of Kosslinger et al. does not specifically disclose that the resonator has a lateral extension which is chosen from the range of 20 um inclusive to 1000 um inclusive.

H. Baltes discloses a lateral extension of 300 um (specification page 5, line 17-19).

A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin in view of Kosslinger et al. to disclose a resonator having a lateral extension of 300um, as taught by H. Baltes, for reducing the size and cost of the piezoelectric resonator.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150), in view of Kosslinger et al. (applicant's admitted prior

art, specification page 2, lines 4-24), and further in view of Hirama et al. (U. S. Patent No. 4, 870, 313).

As for claim 7, Kobrin in view of Kosslinger et al. discloses the device as in claims 1 and 5. Kobrin in view of Kosslinger et al. does not specifically disclose that the surface section (6) for sorption of the substance of the fluid is disposed at a recess of the semiconductor substrate.

Hirama et al. disclose a surface section disposed at a recess of the semiconductor substrate, for the purpose of utilizing the characteristic in a vibration energy trapping mode of a higher order symmetric or asymmetric mode vibration of the piezoelectric resonator (col. 3, lines 6-15).

A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin in view of Kosslinger et al. to dispose the sorption surface section at a recess of the semiconductor substrate, as taught by Hirama et al., for the purpose of utilizing the characteristic in a vibration energy trapping mode of a higher order symmetric or asymmetric mode vibration of the piezoelectric resonator(col. 2, lines 36-39).

4. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150), in view of Kosslinger et al. (applicant's admitted prior art, specification page 2, lines 4-24), and further in view of Chang et al. (U. S. Pat. No. 6, 607, 934).



As for claims 11-12, Kobrin in view of Kosslinger et al. discloses the device as in claims 1 and 8-10. Kobrin in view of Kosslinger et al. does not specifically disclose that the device for establishing electric contact between the resonator and the external evaluation device is a LTCC device and that a flip-chip technology is used.

Chang et al. disclose the use of LTCC and flip-chip technology for obtaining a lower dielectric attenuation and for cost-saving purposes (col. 6, lines 6-30).

A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin in view of Kosslinger et al. to use LTCC and the flip-chip technology, as taught by Chang et al., for obtaining a lower dielectric attenuation and for cost-saving purposes (col. 6, lines 6-30).

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150) in view of Kosslinger et al. (applicant's admitted prior art, specification page 2, lines 4-24), and further in view of Baer et al. (U. S. Patent No. 5, 130, 257).

As for claim 17, Kobrin in view of Kosslinger et al. discloses the device as in claims 1 and 15-16. Kobrin in view of Kosslinger et al. does not specifically disclose that the spacing between adjacent array elements is chosen from the range of 50 um inclusive to 1000 um inclusive.

Baer et al. disclose a spacing between adjacent array is chosen from a range of 50um inclusive to 1000 um inclusive (1-100 micron, col. 4, line 41).

A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin in view of Kosslinger et al. to disclose a spacing chosen from a range of 50 um to 1000 um, as taught by Baer et al., for the purpose of reducing the overall size of the resonator array, and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F. 2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

6. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobrin et al. (U. S. Patent No. 5, 936, 150) in view of Kosslinger et al. (applicant's admitted prior art, specification page 2, lines 4-24), and further in view of Zhang et al. (U. S. Pub. No. 2005/0148065).

As for claims 19-21, Kobrin in view of Kosslinger et al. discloses the method as in claim 18. Kobrin in view of Kosslinger et al. does not specifically disclose that the resonance frequency is determined in the presence of the fluid; in the absence of the fluid; and a liquid is used as the fluid and after the fluid and the resonator are brought into contact and before the resonance frequency is determined the fluid is removed in such a way that the substance remains sorbed on the surface section of the resonator.

Zhang et al. disclose determining the frequency response in the presence of the fluid (when only a portion of the fluid is removed, some fluid is still present when frequency response is determined, see claim 29); in the absence of the fluid (when all fluid is removed as in claim 30); and a liquid is used as the fluid and after the fluid and

the resonator are brought into contact and before the resonance frequency is determined the fluid is removed in such a way that the substance remains sorbed on the surface section of the resonator (claim 30), for the advantage of greater detection sensitivity and faster response time and the ability to perform detection of target molecules during or after exposure to wet environments (see [0057]).

A person of ordinary skill in the art would find it obvious at the time the invention was made to further modify Kobrin in view of Kosslinger et al. to determine the resonance frequency in the presence of the fluid or in the absence of the fluid; and to use liquid as the fluid, and after the fluid and the resonator are brought into contact and before the resonance frequency is determined, to remove the fluid in such a way that the substance remains sorbed on the surface section of the resonator, as taught by Zhang et al., for the purpose of obtaining greater detection sensitivity and faster response time and the ability to perform detection of target molecules during or after exposure to wet environments (see [0057]).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-2 and 4-23 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 2858

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amy He whose telephone number is (571) 272-2230.

The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Hirshfeld can be reached on 571-272-2168. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AH  
September 14, 2006.

  
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